RD-26408-5
PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s):	John Frederick Ackerman et al.	Art Unit: 1792
Serial No.:	10/632,741	Examiner: Perrin, Joseph L.
Filed:	August 1, 2003	
For:	APPARATUS FOR WASHING GAS TURBINE ENGINES	

DECLARATION OF JOHN ACKERMAN SUBMITTED UNDER 37 C.F.R. 1.132

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

In support of the AMENDMENT in response to the Office Action dated October 8, 2009, please consider the following declaration submitted under 37 C.F.R. 1.132.

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I, John Ackerman, declare as follows:

1. I am an inventor of the subject matter claimed in the above-entitled United States patent application having serial number 10/632,741 (hereinafter referred to as "the '741 application").

2. I have thoroughly reviewed: (1) the amended claims of the '741 application; (2) the Office Action dated October 8, 2009; (3) U.S. Patent No. 4,059,123 to Bartos et al. (hereinafter referred to as "Bartos"); (4) U.S. Patent No. 5,944,483 to Beck et al. (hereinafter referred to as "Beck"); and (5) U.S. Patent No. 5,273,395 to McDermott (hereinafter referred to as "McDermott").

3. Amended Claim 18 of the '741 application is directed to a gas turbine engine assembly including a gas turbine engine, a pump, and a ring manifold. The gas turbine engine has a compressor, and the ring manifold is coupled in fluid communication with the pump. The ring manifold is mounted within the gas turbine engine upstream from the compressor, and the ring manifold includes a plurality of circumferentially-spaced spray nozzles with at least one of the plurality of circumferentially-spaced spray nozzles oriented to discharge liquid radially inwardly such that at least a portion of the compressor is coated with the liquid.

4. Amended Claim 20 of the '741 application is directed to a washing system for a gas turbine engine having a compressor. The washing system includes a pump and a ring manifold configured to be coupled in fluid communication with the pump. The ring manifold is mountable within the gas turbine engine upstream from the compressor, and the ring manifold includes a plurality of circumferentially-spaced spray nozzles. At least one of the plurality of circumferentially-spaced spray nozzles is configured to be oriented to discharge liquid radially inwardly.

5. Bartos describes a turbine engine cleaning unit (10). Unit (10) includes a water reservoir (18), a preservative reservoir (20), a cleaner reservoir (22), and a solvent

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reservoir (24). A ring assembly (96) injects fluid into a gas turbine engine. Ring assembly (96) includes two arcuate tube sections (222, 224) that are each coupled to a T-section (226). T-section (226) is coupled to a high pressure hose (94) that is coupled in flow communication with unit (10). Ring assembly (96) is mounted "in coaxial symmetry with the hub shroud of the turbine engine" to spray liquid perpendicular to the plane of the assembly (i.e., to discharge liquid axially within the engine) (see column 5, lines 23-28 of Bartos).

6. Beck describes an exhaust-gas turbine of a turbocharger having a turbine casing (1) formed by gas-inlet and gas-outlet casings (2 and 3). A turbine impeller (5) is positioned upstream of a nozzle ring (7), and a flow duct (8) is formed between turbine impeller (5) and turbine casing (1). Flow duct (8) receives exhaust gases of a diesel engine connected to the turbocharger and passes them on to turbine impeller (5) (i.e., flow duct (8) is positioned downstream of a compressor). A nozzle ring (7) having a plurality of nozzles (11) is positioned such that each nozzle (11) extends into flow duct (8) to facilitate injecting water (37) axially into flow duct (8).

7. Discharging liquid radially inwardly, as recited in the presently pending claims, has the following advantages over discharging liquid axially, as taught by Bartos and Beck: (1) liquid discharged radially inwardly has a radial component of momentum that imparts both normal and tangential forces on blade build-up, giving the liquid a better scrubbing action than liquid discharged axially; (2) liquid discharged radially inwardly will not entrain in the airflow as much as liquid discharged axially, thereby reaching more of the surfaces that are parallel to the centerline of the engine; and (3) the volumetric distribution of radially inwardly discharged liquid particles naturally mimics the cross-section of the engine and, therefore, follows the distribution of the surface area to be cleaned better than liquid discharged axially (i.e., more of the radially inwardly discharged liquid particles are maintained near the highest fraction of compressor surface area, which is closer to the outer radius than the inner radius).

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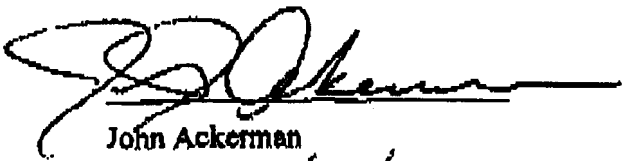
8. McDermott describes a method of cleaning a gas turbine engine. The gas turbine engine includes a cylindrical hollow portion (2) and a curved air-flow directional portion (4). A manifold ring (20) is mounted outside of and apart from the gas turbine engine via a support frame (38) such that the liquid is discharged outside of the engine to generate a fog that is accelerated into the engine (see column 4, lines 40-48 of McDermott). McDermott also teaches that discharging liquid "directly in the engine" is undesirable (see column 4, lines 40-48 of McDermott).

9. Discharging liquid radially inwardly, as recited in the presently pending claims, has the following advantages over discharging liquid outside of the engine, as taught by McDermott: (1) by discharging liquid outside of the engine, the momentum generated from discharge is lost, and only the airflow momentum is preserved, meaning that liquid discharged outside of the engine has a less effective scrubbing capability than liquid discharged radially inwardly, given that liquid with more momentum has a better scrubbing capability; and (2) by discharging liquid outside of the engine, control over the radial distribution of the liquid particles is lost, meaning that it is easier to prevent overly spraying particular surfaces of the engine when the liquid is discharged radially inwardly (e.g., it is easier to prevent mid-span areas from being overly sprayed).

10. I further declare that: (1) all statements made herein of my own knowledge are true; (2) all statements made on information and belief are believed to be true; and (3) these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.



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Date